

Claims

- [c1] 1. A method of forming a plurality of bumps on a silicon wafer having an active surface, wherein the wafer further includes a plurality of contact pads distributed over the active surface and a passivation layer over the active surface that exposes the contact pads, the method comprising the steps of:
- forming an adhesion layer over the active surface of the wafer, wherein the adhesion layer covers both the contact pads and the passivation layer;
 - forming at least one metallic layer over the adhesion layer;
 - patterning the adhesion layer and the metallic layer so that a residual portion of the adhesion layer and a residual portion of the metallic layer are formed over each contact pad;
 - forming a photoresist layer over the active surface of the wafer, wherein the photoresist layer has a plurality of openings that expose the metallic layer;
 - filling the openings with a flux material;
 - disposing a solder block into each opening;
 - conducting a reflow process so that the solder blocks are bonded to the metallic layer; and

removing the flux material and the photoresist layer.

- [c2] 2. The method of claim 1, wherein material constituting the adhesion layer is selected from a group consisting of aluminum, titanium, titanium–tungsten alloy, chromium, chromium–copper alloy, copper and tantalum.
- [c3] 3. The method of claim 1, wherein material constituting the metallic layer is selected from a group consisting of nickel–vanadium alloy, titanium nitride, tantalum nitride, nickel, chromium–copper alloy, chromium, copper and palladium.
- [c4] 4. The method of claim 1, wherein material constituting the solder blocks includes lead–tin alloy.
- [c5] 5. The method of claim 1, wherein material constituting the solder blocks includes lead–free alloy.
- [c6] 6. The method of claim 5, wherein material constituting the solder blocks is selected from a group consisting of lead, gold, silver, copper, magnesium, bismuth, anti–mony, indium and zinc.
- [c7] 7. The method of claim 1, wherein material constituting the contact pads is selected from a group consisting of copper and aluminum.
- [c8] 8. The method of claim 1, wherein the solder block is

ball shaped.

- [c9] 9. A method of forming bumps over a carrier having a surface with a plurality of contact pads thereon, comprising the steps of:
- forming an adhesion layer over the surface of the carrier, wherein the adhesion layer covers the contact pads;
 - forming at least one metallic layer over the adhesion layer;
 - patterning the adhesion layer and the metallic layer so that a residual portion of the adhesion layer and a residual portion of the metallic layer are formed over each contact pad;
 - forming a patterned structure over the surface of the carrier, wherein the patterned structure has a plurality of openings that expose the metallic layer;
 - filling the openings with a flux material;
 - disposing a solder block into each opening;
 - conducting a reflow process so that the solder blocks are bonded to the metallic layer; and
 - removing the flux material and the patterned structure.
- [c10] 10. The method of claim 9, wherein the carrier includes a silicon wafer.
- [c11] 11. The method of claim 9, wherein the carrier includes a silicon wafer and a redistribution circuit layer, the redis-

tribution circuit layer is formed over the silicon wafer, the surface of the carrier is a surface of the redistribution layer, the contact pads are located on the surface of the redistribution layer and the redistribution layer having openings exposing the contact pads.

- [c12] 12. The method of claim 9, wherein the carrier includes a substrate board.
- [c13] 13. The method of claim 9, wherein material constituting the adhesion layer is selected from a group consisting of aluminum, titanium, titanium–tungsten alloy, chromium, chromium–copper alloy, copper and tantalum.
- [c14] 14. The method of claim 9, wherein material constituting the metallic layer is selected from a group consisting of nickel–vanadium alloy, titanium nitride, tantalum nitride, nickel, chromium–copper alloy, chromium, copper and palladium.
- [c15] 15. The method of claim 9, wherein material constituting the solder blocks includes lead–tin alloy.
- [c16] 16. The method of claim 9, wherein material constituting the solder blocks includes lead–free alloy.
- [c17] 17. The method of claim 16, wherein material constituting the solder blocks is selected from a group consisting

of lead, gold, silver, copper, magnesium, bismuth, antimony, indium and zinc.

- [c18] 18. The method of claim 9, wherein the patterned structure is a photoresist layer.
- [c19] 19. The method of claim 9, wherein material constituting the patterned structure is polymer.
- [c20] 20. The method of claim 9, wherein material constituting the contact pads is selected from a group consisting of copper and aluminum.
- [c21] 21. The method of claim 9, wherein the solder block is ball shaped.
- [c22] 22. A method of forming bumps over contact pads, comprising the steps of:
depositing a flux material over the contact pads;
positioning a solder block on the flux material;
conducting a reflow process so that the solder blocks are bonded to the respective contact pads; and
removing the flux material.
- [c23] 23. The method of claim 22, wherein before the step of depositing flux material over the contact pads, further includes forming an adhesion layer over the contact pads and a metallic layer over the adhesion layer, and the flux

material is deposited on the metallic layer above the contact pads.

[c24] 24. The method of claim 23, wherein material constituting the adhesion layer is selected from a group consisting of aluminum, titanium, titanium-tungsten alloy, chromium, chromium-copper alloy, copper and tantalum.

[c25] 25. The method of claim 23, wherein material constituting the metallic layer is selected from a group consisting of nickel-vanadium alloy, titanium nitride, tantalum nitride, nickel, chromium-copper alloy, chromium, copper and palladium.

[c26] 26. The method of claim 22, wherein material constituting the solder blocks includes lead-tin alloy.

[c27] 27. The method of claim 22, wherein material constituting the solder blocks includes lead-free alloy.

[c28] 28. The method of claim 27, wherein material constituting the solder blocks is selected from a group consisting of lead, gold, silver, copper, magnesium, bismuth, antimony, indium and zinc.

[c29] 29. The method of claim 22, wherein material constituting the contact pads is selected from a group consisting

of copper and aluminum.

[c30] 30. The method of claim 22, wherein the solder block is ball shaped.